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(54) METHOD FOR DETECTING SUPPORT WEIGHT TO MONOLITHIC STRUCTURE

(57)Abstract:

PURPOSE: To facilitate the judgement of adhesion amount, by method wherein a wt. is preliminarily printed on the outer surface of a monolithic structure when said structure is immersed in an aqueous slurry of a solid powder to support said solid powder and the printed structure is preliminarily covered with water repellent paint and, after the solid powder is adhered to the monolithic structure, the printed character is read to calculate the amount of the powder.

CONSTITUTION: When a predetermined amount of coating is applied to a honeycomb structure composed of a metal or ceramic by immersing said structure in an inorg. powder-containing slurry, the following method is taken. That is, when it is necessary to apply heat-treatment to said structure later, the printed of a wt. is applied to the structure using heat resistank ink containing a manganese or cobalt compound and the printed structure is covered with transparent water repellent paint based on a fluororesin. Thereafter, if necessary, the volatile compound in the coating is removed under heating and the structure is immersed in an inorg. substance-containing slurry to apply coating to the structure. By this constitution, the wt. written on the structure by printing before coating and the wt. of them structure after coating are operated to judge whether a desired amount of the powder is adhered.

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CLAIMS

[Claim(s)]

[Claim 1] By arranging the compressive ingredient which has cushioning properties in the state of compression, and giving compression planar pressure through said compressive ingredient to said cellular structure object between the periphery section of a cellular structure object, and a tubed metal vessel In the approach of assembling the assembly which carried out receipt grasping of the cellular structure object into the metal vessel through the compressive ingredient by grasping said cellular structure object in said metal vessel Before entering like an assembler, display the information about the outer-diameter dimension of said cellular structure object, and/or the inside diameter of said metal vessel on the member front face beforehand, and it sets like an assembler. The approach of assembling characterized by selecting the cellular structure object which reads said information and serves as suitable grasping conditions based on the information, and a metal vessel.

[Claim 2] By arranging the compressive ingredient which has cushioning properties in the state of compression, and giving compression planar pressure through said compressive ingredient to said cellular structure object between the periphery section of a cellular structure object, and a tubed metal vessel In the approach of assembling the assembly which carried out receipt grasping of the cellular structure object into the metal vessel through the compressive ingredient by grasping said cellular structure object in said metal vessel Before entering like an assembler, display the information about the outer-diameter dimension of said cellular structure object on the member front face beforehand, and it sets like an assembler. The approach of assembling characterized by reading said information, manufacturing a metal vessel based on the information so that it may become suitable grasping conditions, and combining with said cellular structure object.

[Claim 3] The approach according to claim 1 or 2 of assembling that the display format of said information is an alphabetic character.

[Claim 4] The approach according to claim 1 or 2 of assembling that the display form of said information is a bar code.

[Claim 5] The approach according to claim 1 or 2 of assembling which displays said information by two kinds of display formats.

[Claim 6] The approach according to claim 1 or 2 of assembling which displays said information by the display format of both an alphabetic character and a bar code.

[Claim 7] An approach to assemble a publication in claim 3 which displays said information in ink thru/or any 1 term of 6.

[Claim 8] An approach to assemble a publication in claim 3 which displays said information in heat-resistant ink thru/or any 1 term of 6.

[Claim 9] An approach to assemble a publication in claim 3 which displays said information in two kinds of ink thru/or any 1 term of 6.

[Claim 10] An approach to assemble a publication in claim 3 which displays said information in both heat-resistant ink and ink without thermal resistance thru/or any 1 term of 6.

[Claim 11] An approach for the approach of displaying said information in ink to assemble a publication

- in claim 7 which is the ink jet approach or the hot printing approach thru/or any 1 term of 10.
- [Claim 12] An approach to assemble a publication in claim 3 which displays said information with laser thru/or any 1 term of 6.
- [Claim 13] An approach to assemble a publication in claim 3 which displays said information with sandblasting thru/or any 1 term of 6.
- [Claim 14] An approach to assemble a publication in claim 3 which displays said information by chemical corrosive action thru/or any 1 term of 6.
- [Claim 15] An approach to assemble a publication in claim 3 which displays said information by sealing with a stamp thru/or any 1 term of 6.
- [Claim 16] An approach to assemble a publication in claim 3 displayed by printing said information on a label and sticking on said member front face thru/or any 1 term of 6.
- [Claim 17] An approach to assemble a publication in claim 3 which displays said information with two kinds of methods of presentation thru/or any 1 term of 6.
- [Claim 18] An approach to assemble a publication in claim 3 which displays said information with the method of presentation of both the ink jet approach or the hot printing approach, and the method of sealing with a stamp thru/or any 1 term of 6.
- [Claim 19] An approach to assemble a publication in claim 7 which applies transparent water-repellent liquid on the displayed information thru/or any 1 term of 11, after displaying said information.
- [Claim 20] The approach according to claim 19 of assembling that said water-repellent liquid is resin or a silica sol.
- [Claim 21] An approach to assemble a publication in claim 1 which is one sort of ingredients or two or more sorts of composite material which were chosen from the group which it becomes from the non-heating expansibility mat with which the compressive ingredient which has said cushioning properties uses as a principal component a metal wire mesh, ceramic fiber, and the heating expansibility mat and ceramic fiber that consist of vermiculites, and does not contain a vermiculite thru/or any 1 term of 20.
- [Claim 22] An approach for receipt of said cellular structure object into said metal vessel and the approach of giving compression planar pressure through said compressive ingredient to said cellular structure object to assemble a publication in claim 1 which are the clamshell approach, the approach of pushing in, the volume fastening approach, the pipe shrinking approach, or the roll-forging approaches thru/or any 1 term of 21.
- [Claim 23] An approach to assemble a publication for this cellular structure object in claim 1 which comes to carry out receipt grasping into said metal vessel thru/or any 1 term of 22, after supporting a catalyst component on said cellular structure object.
- [Claim 24] An approach to assemble a publication in claim 1 which supported the catalyst component on this cellular structure object thru/or any 1 term of 22, after carrying out receipt grasping of said cellular structure object into said metal vessel.
- [Claim 25] The assembly assembled by the approach to assemble a publication in claim 1 thru/or any 1 term of 24.
- [Claim 26] The assembly according to claim 25 used as a catalytic converter for automobile exhaust purification.
- [Claim 27] The assembly according to claim 25 or 26 which is the honeycomb-like structure which has the peripheral wall in which said cellular structure object encloses two or more cell paths formed by two or more septa, and it.
- [Claim 28] The assembly according to claim 25 or 26 said whose cellular structure object is the form-like structure.
- [Claim 29] An assembly given in claim 25 which is what said cellular structure object becomes from the composite of one sort of ceramic ingredients chosen from the group which consists of cordierite, an alumina, a mullite, lithium aluminum silicate, aluminum titanate, a titania, a zirconia, silicon nitride, aluminum nitride, and silicon carbide, or two or more sorts of ceramic ingredients thru/or any 1 term of 28.
- [Claim 30] An assembly given in claim 25 which is what said cellular structure object becomes from

one sort of adsorption ingredients chosen from the group which consists of activated carbon, silica gel, and a zeolite thru/or any 1 term of 28.

[Claim 31] An assembly given in claim 25 which arranged two or more cellular structure objects to the serial through the compressive ingredient which has cushioning properties in one metal vessel along the direction of a cel path thru/or any 1 term of 30.

[Claim 32] An assembly given in claim 25 which arranged to the serial two or more assemblies which carried out receipt grasping of the one cellular structure object through the compressive ingredient which has cushioning properties into one metal vessel in one metal outer case along the direction of a cel path of a cellular structure object thru/or any 1 term of 30.

[Claim 33] The cellular structure object with which said information used for an approach to assemble a publication in claim 1 thru/or any 1 term of 24 was displayed.

[Claim 34] The cellular structure object according to claim 33 used for the catalytic converter for automobile exhaust purification.

[Claim 35] The cellular structure object according to claim 33 or 34 which is the honeycomb-like structure which has the peripheral wall which encloses two or more cel paths formed by two or more septa, and it.

[Claim 36] The cellular structure object according to claim 33 or 34 which is the form-like structure.

[Claim 37] A cellular structure object given in claim 33 which is what consists of a composite of one sort of ceramic ingredients chosen from the group which consists of cordierite, an alumina, a mullite, lithium aluminum silicate, aluminum titanate, a titania, a zirconia, silicon nitride, alumimium nitride, and silicon carbide, or two or more sorts of ceramic ingredients thru/or any 1 term of 36.

[Claim 38] A cellular structure object given in claim 33 which is what consists of one sort of adsorption ingredients chosen from the group which consists of activated carbon, silica gel, and a zeolite thru/or any 1 term of 36.

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DETAILED DESCRIPTION

[Detailed Description of the Invention]

[0001]

[Field of the Invention] This invention displays proper information on the front face of the member which constitutes said assembly in more detail about the approach of assembling the assembly which carried out receipt grasping of the cellular structure object into the metal vessel through the compressive ingredient, and relates to the approach of performing the assembly of the assembly by the members used as suitable combination conditions, using the proper information concerned. This invention is applicable to support for catalysts or a filter used for the object for an internal combustion engine's exhaust gas purification, the catalyst support for deodorization, a filter, or the chemical reaction device using a catalysis, for example, the reforming machine for fuel cells etc.

[0002]

[Description of the Prior Art] What carried out the grasping receipt (canning) of the cellular structure object into the metal vessel is known by arranging the compressive ingredient which has cushioning properties and giving predetermined compression planar pressure through a compressive ingredient between a cellular structure object and a tubed metal vessel (can), to a cellular structure object as an assembly used for applications, such as a catalytic converter used for the chemical reaction device using an internal combustion engine's emission gas purification and catalysis or a filter, and a heat exchanger.

[0003] For example, in using such an assembly as a catalytic converter for automobile exhaust purification, through a ceramic mat etc., in a metal vessel (can), receipt grasping is carried out and it carries at the honeycomb-like structure made from a ceramic which is a kind of a cellular structure object what carried out distributed support of the noble metals, such as platinum, palladium, and a rhodium, as a catalyst component in an exhaust air system.

[0004] Although it is desirable to have high reinforcement since a cellular structure object is grasped in a metal vessel when compression planar pressure is given by the peripheral face as mentioned above, in the honeycomb-like structure used as catalyst support for automobile exhaust purification, thin wall-ization of a cel septum is advancing for the improvement in the purification engine performance, and level on the strength is falling in connection with this.

[0005] The reinforcement of a cellular structure object can be measured by "AISO static disruptive strength trial." This puts a cellular structure object into the tubed container of rubber, covers by aluminum plate manufacturing, it is underwater, is the trial which performs isostatic pressing compression, and is simulating the compression load load in case peripheral face grasping of the cellular structure object is carried out to the can of a converter. AISO static reinforcement is shown by the pressurization pressure value when support breaks, and is prescribed by automobile specification JASO specification M505-87 of the Society of Automotive Engineers of Japan issue.

[0006] Generally, it has turned out that it becomes very difficult, as for the honeycomb-like structure made from a ceramic used as catalyst support of the converter for automobile exhaust purification, to maintain AISO static reinforcement to 10kg/cm² or more if cel septum thickness is 0.11mm or less and a numerical aperture exceeds 85%.

[0007] If it seems that the AISO static reinforcement of a cellular structure object is exceeded when it generates in canning with actual planar pressure higher than the design planar pressure set up at the time of a canning design, there is risk of the structure being damaged in the part. Although it is required to lower design planar pressure as the cel septum thickness of a cellular structure object becomes thin and structure level on the strength becomes low, the abnormality rise of actual canning planar pressure is suppressed, and it is necessary to make fluctuation of planar pressure as small as possible. It will aim, if design planar pressure and actual planar pressure are equal, and the canning design of a passage is possible, and it is ideal.

[0008] Furthermore, it may originate in the appearance precision of a cellular structure object, and the compression pressure to which that the gap between a cellular structure object and the metal vessel which holds it is not fixed acts on the periphery section of a cellular structure object owing to may not become homogeneity, but a cellular structure object may be damaged in big grasping planar pressure acting partially.

[0009] On the other hand, since it becomes impossible to grasp a cellular structure object in a metal vessel by receiving elevated-temperature exhaust gas flow and vibration under a real operating environment when planar pressure is lowered too much, the need minimum planar pressure exists. Since the AISO static level of a cellular structure object on the strength falls as the septum thickness of a cellular structure object becomes thin, variation in planar pressure is also made small, namely, it is necessary to also make compression planar pressure which grasps a cellular structure object more uniform planar pressure distribution as it is necessary to make it as low as possible and the level of compression planar pressure becomes low, holding the minimum planar pressure required for cellular structure object grasping.

[0010]

[Problem(s) to be Solved by the Invention] In order to carry out receipt grasping of the cellular structure object in the condition suitable in a metal vessel, it is desirable to make variation in the dimension configuration of a cellular structure object as small as possible. However, the honeycomb-like structure made from a ceramic used as above catalyst support Since it is contained in a metal vessel with the condition of having been calcinated after drying as it is and being processed into predetermined die length after extrusion molding, the outer-diameter dimension of the honeycomb-like structure It will be in the condition that shaping, desiccation, and the dimension fluctuation and deformation of baking in all processes were added, and has the variation in a very big dimension configuration compared with the metal workpiece etc.

[0011] Although it is performed that carry out machining removal of the periphery after baking, and ceramic cement covers a periphery in a part the back in the honeycomb-like structure of large-sized size, practical use is presented without generally machining the periphery of the honeycomb-like structure made from a ceramic after baking. Therefore, while examination of how to improve the outer-diameter precision of the honeycomb-like structure made from a ceramic is made, when containing the honeycomb-like structure made from a ceramic in a metal vessel, it has been a technical problem how the effect of the variation in a honeycomb-like structure outer-diameter dimension is suppressed small.

[0012] This invention is made in view of the above-mentioned conventional problem, in case it assembles the assembly which carried out receipt grasping of the cellular structure object into the metal vessel through the compressive ingredient, even if there is variation in the dimension of members, such as a cellular structure object which constitutes the assembly concerned, etc., it suppresses the effect, and it aims at offering the approach by which the suitable grasping condition that no breakage of a cellular structure object etc. is is acquired easily and which assembles.

[0013]

[Means for Solving the Problem] By according to this invention, arranging the compressive ingredient which has cushioning properties in the state of compression, and giving compression planar pressure through said compressive ingredient to said cellular structure object between the periphery section of a cellular structure object, and a tubed metal vessel In the approach of assembling the assembly which carried out receipt grasping of the cellular structure object into the metal vessel through the compressive

ingredient by grasping said cellular structure object in said metal vessel Before entering like an assembler, display the information about the outer-diameter dimension of said cellular structure object, and/or the inside diameter of said metal vessel on the member front face beforehand, and it sets like an assembler. Said information is read and approach (the 1st invention) ** which is characterized by selecting the cellular structure object used as suitable grasping conditions and a metal vessel based on the information and to assemble is offered.

[0014] By moreover, the thing for which according to this invention the compressive ingredient which has cushioning properties is arranged in the state of compression, and compression planar pressure is given through said compressive ingredient to said cellular structure object between the periphery section of a cellular structure object, and a tubed metal vessel In the approach of assembling the assembly which carried out receipt grasping of the cellular structure object into the metal vessel through the compressive ingredient by grasping said cellular structure object in said metal vessel Before entering like an assembler, display the information about the outer-diameter dimension of said cellular structure object on the member front face beforehand, and it sets like an assembler. Said information is read, and based on the information, approach (the 2nd invention) ** which is characterized by manufacturing a metal vessel and combining with said cellular structure object and to assemble is offered so that it may become suitable grasping conditions.

[0015] Furthermore, according to this invention, assembly (the 3rd invention) ** assembled by the approach to assemble above-mentioned either is offered.

[0016] Furthermore, according to this invention, cellular structure object (the 4th invention) ** as which said information used for an approach to assemble above-mentioned either was displayed is offered.

[0017]

[Embodiment of the Invention] As mentioned above, the assembly which carried out receipt grasping of the cellular structure object used for a catalytic converter etc. into the metal vessel through the compressive ingredient is arranging the compressive ingredient which has cushioning properties in the state of compression, and giving compression planar pressure through a compressive ingredient to a cellular structure object between the periphery section of a cellular structure object, and a tubed metal vessel, and is assembled by grasping a cellular structure object in a metal vessel.

[0018] In an approach to assemble such an assembly, the 1st invention displays the information about the outer-diameter dimension of a cellular structure object, and/or the inside diameter of a metal vessel on the member front face beforehand, before entering like an assembler, it sets it like an assembler, reads said information, and is characterized by selecting the cellular structure object used as suitable grasping conditions, and a metal vessel based on the information.

[0019] Thus, planar pressure is given to a metal vessel in the suitable range for the cellular structure object by which receipt grasping was carried out by selecting the cellular structure object and metal vessel which serve as combination of a respectively suitable dimension from the information about the outer-diameter dimension of the cellular structure object displayed on the member front face, and/or the inside diameter of a metal vessel.

[0020] The 2nd invention is characterized by displaying the information about the outer-diameter dimension of said cellular structure object on the member front face beforehand, before entering like an assembler, setting like an assembler, reading said information, manufacturing a metal vessel based on the information, so that it may become suitable grasping conditions, and combining with said cellular structure object in an approach to assemble the same assembly.

[0021] Thus, planar pressure is given to a metal vessel in the suitable range for the cellular structure object by which receipt grasping was carried out by producing the metal vessel which has a suitable inside diameter according to the dimension, and combining both from the information about the proper outer-diameter dimension of each cellular structure object displayed on the member front face.

[0022] An alphabetic character and a bar code can be used for informational display form in the 1st and 2nd invention. You may display using two kinds of display form, for example, information can also use together the display form of both an alphabetic character and a bar code. Moreover, information can be displayed by sealing (*****) by ink spreading, laser, sandblasting, chemical corrosive action,

and the stamp etc. Information is printed on a label and you may make it stick the label on a member front face. When ink expresses information, it is desirable to use the ink jet approach or the hot printing approach.

[0023] It is also possible to be able to use two kinds of approaches together, for example, to use together the method of presentation of both the ink jet approach or the hot printing approach, and a stamping also about the method of presentation of these information. Moreover, when displaying information in ink, you may make it use together two kinds of ink, for example, heat-resistant ink, and ink without thermal resistance if needed.

[0024] In addition, when the assembly assembled by this invention is what supports a catalyst component on a cellular structure object like a catalytic converter, after displaying information, it is desirable to apply transparent water-repellent liquid like resin, such as lacquer, paraffin, and vinyl, or a silica sol on the displayed information.

[0025] The cellular structure object used as support is mainly colored various colors of a brown network by the class and concentration of a catalyst component from blackish brown to black after catalyst component support. Moreover, since a catalyst component is fixed to support, it heat-treats at about 400-800 degrees C and baking is performed, when displaying information in ink, heat-resistant ink is used. Moreover, as for a catalyst component, it is desirable for there to be a certain amount of absorptivity in support (cellular structure object), in order to make it a water solution generally and to support to support, and what consists of an ingredient whose porosity is usually about 20 - 40% is used.

[0026] In such conditions, if catalyst attachment which slushes the water solution containing a catalyst component in the through tube of a cellular structure object is performed without applying the above water-repellent liquid on the displayed information, the water solution concerned will also color the part as which the information on effusion and a peripheral face was displayed to the peripheral wall of a cellular structure object through the pore which was open for free passage with capillarity. Since there is much what, as for heat-resistant ink, the class is restricted, and the thing of a vivid color does not have, and becomes the color of the brown network same after heat treatment as a catalyst component, if it is colored to the part as which information was displayed, it will be hard coming to read information. When it does not color uniformly but is especially colored in the shape of a mottling, the phenomenon a readout becomes impossible arises by the approach of reading of which clearness like image analysis is required.

[0027] On the other hand, if the above water-repellent liquid is applied on the displayed information, water-repellent liquid enters into the front face of a display, and the pore of an ingredient, when catalyst attachment is carried out, it can crawl the water solution which oozes out to a peripheral wall by capillarity, and the water solution which drips to a peripheral-wall front face, can prevent coloring of an information-display part, and can maintain the condition in which a readout is possible.

[0028] Since the print of a seal which pigment content was highly made compared with the ink jet in the case of the stamping although print of a seal became thin since it was necessary to make grain size of the pigment small to the heatproof component of heat-resistant ink be a pigment (mineral powder) and apply to an ink jet, and there were still also not much more contents and it was not able to do, and was sealed becomes thickly and deep, contrast can be secured, consequently osmosis of a catalyst component can be prevented, and literacy can be raised.

[0029] However, in the case of a stamping, in order to seal mechanically, there is a fault which requires time amount as compared with an ink jet. Therefore, it may be convenient, if it prints by the ink jet at the speed of quick Rhine and a stamp is carried out in another Rhine. In this case, if the ink of a stamping is made into thermal resistance even when thermal resistance is finally required, the thermal resistance of the ink of an ink jet is necessarily unnecessary.

[0030] As a compressive ingredient which has cushioning properties, one sort of ingredients or two or more sorts of composite material which were chosen from the group which consists of a non-heating expansibility mat which uses as a principal component a metal wire mesh, ceramic fiber, and the heating expansibility mat and ceramic fiber that consist of vermiculites, and does not contain a vermiculite are desirable.

[0031] Since ceramic fiber, such as an alumina, a high alumina, a mullite, silicon carbide, silicon nitride, a zirconia, and a titania, is used as a principal component, and the compressive force which will act on a cellular structure outside-of-the-body periphery at operating temperature within the limits if the non-heating expansibility mat which does not contain a heating nature expansion ingredient like a vermiculite is used is not changed sharply but compressive force moreover acts on the whole cellular structure outside-of-the-body periphery substantially especially at homogeneity when a cellular structure object is thin box-frame construction, it is desirable.

[0032] As an approach of giving compression planar pressure through a compressive ingredient to receipt of the cellular structure object into a metal vessel, and a cellular structure object, it is desirable to use the approach of of the clamshell approach, the approach of pushing in, the volume fastening approach, the pipe shrinking approach, or the roll-forging approaches.

[0033] It is the honeycomb-like structure which has two or more cel paths formed by two or more septa as a cellular structure object, and the thing whose cel septum thickness is 0.1 mm or less and whose numerical aperture is 85% or more is desirable. Furthermore, it has the outer wall which forms the outer-diameter profile in the perimeter of the structure as the honeycomb-like structure, and that the outer wall thickness of whose is at least 0.05mm is desirable. In addition, as a cellular structure object used in this invention, you may be the form-like structure besides the above honeycomb-like structures.

[0034] As for a cellular structure object, it is desirable to consist of a composite of one sort of ceramic ingredients chosen from the group which consists of cordierite, an alumina, a mullite, lithium aluminum silicate, aluminum titanate, a titania, a zirconia, silicon nitride, aluminum nitride, and silicon carbide, or two or more sorts of ceramic ingredients. Moreover, what consists of one sort of adsorption ingredients chosen from the group which consists of activated carbon, silica gel, and a zeolite can be used suitably. 21

[0035] In addition, although there are a triangle, a square, a hexagon, a round shape, etc. in the cel configuration of the honeycomb-like structure produced by extrusion molding and many things which generally have the cel of the square which is square-like one are used for it, also in the honeycomb-like structure with the cel of a hexagon, use is progressing recently.

[0036] After carrying out receipt grasping of the cellular structure object into a metal vessel, you may make it support a catalyst component on the cellular structure object, although it carries out receipt grasping of the cellular structure object into a metal vessel after supporting a catalyst component on a cellular structure object and usually supporting a catalyst component on a cellular structure object in using it as a catalytic converter.

[0037] The 3rd invention is the assembly assembled by the approach concerning said 1st or 2nd invention, and since the cellular structure object is grasped in the metal vessel by suitable compression planar pressure as mentioned above, it can be used suitable for the application of the catalytic converter for automobile exhaust purification etc. Moreover, the 4th invention is a cellular structure object before the assembly as which said information used for the approach concerning said 1st or 2nd invention was displayed, information is beforehand expressed as the above various formats and means, and the assembly approach of the 1st or 2nd invention is realized based on the information concerned.

[0038] In addition, the assembly may have structure which arranged two or more cellular structure objects to the serial through the compressive ingredient which has cushioning properties in one metal vessel along the direction of a cel path. Moreover, two or more assemblies which carried out receipt grasping of the one cellular structure object through the compressive ingredient which has cushioning properties into one metal vessel may be arranged and used for a serial into one metal outer case along the direction of a cel path of a cellular structure object. However, in this invention, since the metal vessel dimension is changed according to the outer-diameter dimension of each honeycomb-like structure, when connecting two or more these metal vessels, it is desirable to connect things with size near as much as possible.

[0039]

[Example] In the case where a catalytic converter is hereafter produced using the honeycomb-like structure 1 as shown in drawing 1 (a) and (b) as a cellular structure object, although this invention is

further explained to an example at a detail, this invention is not limited to these examples.

[0040] As an approach of displaying information, such as an alphabetic character and a bar code, on the honeycomb-like structure, printing speed is quick and the approach by the ink jet printer and the approach by laser equipment are non-contact, and when processing an abundant member, they are desirable. The method of presentation especially by laser does not need ink, but since pretreatment is also unnecessary beforehand, it is more desirable than the viewpoint of a maintenance to the ink jet approach.

[0041] Although the dimensional inspection of the honeycomb-like structure is performed at the last of the production process of the honeycomb-like structure, the outer-diameter dimension information by which inspection measurement was carried out there is made to be transmitted to laser marker equipment directly from measuring equipment. As shown in drawing 2, based on the outer-diameter dimension information which the honeycomb-like structure 1 which came out of measuring equipment was sent to laser marker equipment 3 next, and has been sent to coincidence, marking of the bar code is carried out to the outside surface of the honeycomb-like structure 1. Since marking time amount is short and ends, since the marking area is small, and the QR code cannot be easily influenced of the curvature of a honeycomb-like structure outside surface, it is more suitable.

[0042] An example of laser marking conditions is described below. In addition, as laser marker equipment, YAG pulse laser equipment or CO2 carbon-dioxide-laser equipment is suitable.

[0043] - Laser marker equipment : YAG laser marker equipment (Miyachi Technos lamp excitation type ML-4141B)

- Honeycomb-like structure : nature honeycomb of cordierite-like structure (septum 2mil, cel consistency 900cpsi, nominal outer-diameter ϕ 106mm, die length of 114mm)

- marking condition: -- class:CODE39 of current value 17A, the Q.SW frequency of 8kHz, the scanning speed 150 - a 1000 mm/s and a bar code or the QR code, narrow width of face of 0.38mm of CODE39, and the outer-diameter observation average dimension [0044] of the information:honeycomb-like structure put on cell size 0.508mm and the bar code of the QR code According to such laser marking conditions, the honeycomb-like structure made from a ceramic by which marking was carried out in the bar code by the production process is sent to the support process of a catalyst component next. And support of a catalyst component is performed to the honeycomb-like structure conveyed in catalyst support equipment in the support stroke concerned.

[0045] In addition, as the another marking approach, when based on an ink jet, the example of the conditions in the case of being based on a stamping is described below.

[0046] [The example of an ink jet]

- ink jet equipment: -- class [of IMAJIE S4 plus ink]: -- heat-resistant ink (ordinary temperature: after dark brown and heat treatment : orange)

- Honeycomb-like structure : nature honeycomb of cordierite-like structure (septum 2mil, cel consistency 900cpsi, nominal outer-diameter ϕ 106mm, die length of 114mm)

- gestalt [of the information put on the honeycomb-like structure]: -- information: put on a figure and the honeycomb-like structure -- the outer-diameter observation average dimension (strikethrough: and observation mass value) of the honeycomb-like structure

[0047] After having created the frame [in every direction than the information which carried out marking after printing on such conditions] large about 5mm, giving the overcoat within the limit concerned the following condition and supporting a catalyst component to the honeycomb-like structure, it investigated whether recognition of the information by image analysis would be possible. Moreover, what does not give an overcoat as a comparison was offered as a sample. Consequently, although the thing which does not give an overcoat, especially the thing colored in the shape of a mottling cannot be recognized by image analysis but literacy was about 60%, each thing which gave the overcoat was the support process of the water solution containing a catalyst component, since a catalyst did not permeate the outer wall with which marking of the information was carried out, information remained vividly and the figure recognition rate by image analysis was 100%.

[0048] (Conditions 1)

- Overcoat ingredient : transparence coating (Asahipen, acrylic resin)
 - Spreading conditions : spray about 2 seconds (conditions 2)
 - overcoat ingredient: -- the Nissan chemistry silica sol and spreading condition: -- 2 times spreading (conditions 3)
 - overcoat ingredient: -- the thing and spreading condition: which melted silica powder with water -- 2 times spreading [0049] [The example of a stamping]
 - Ink pigment : cobalt oxide (CoO), chrome oxide (Cr 2O3), 40% (as for a color, after ordinary temperature and heat treatment is black) of iron-oxide (Fe 2O3) impalpable powder
 - synthetic-resin: -- 50% and water: -- 10% and honeycomb-like structure: -- the nature honeycomb of cordierite-like structure (septum 2mil, cel consistency 900cps, nominal outer-diameter phi106mm, die length of 114mm)
 - gestalt [of the information put on the honeycomb-like structure]: -- information: put on a figure and the honeycomb-like structure -- the outer-diameter observation average dimension (strikethrough: and observation mass value) of the honeycomb-like structure
- [0050] The ink ingredient was melted to the ink pad on such conditions, and the honeycomb-like structure was sealed in information with the rubber stamp. Moreover, like the case of said ink jet after seal, the overcoat was also carried out, and after supporting a catalyst component to both what gave the overcoat, and the thing which is not given, it investigated whether recognition of the information by image analysis would be possible. Although the time of ***** was carried out in this example using the dark-brown catalyst component, even when an overcoat was not given but it was colored in the shape of a mottling, it was that it has not recognized by image analysis only about that in which seal became blurred, and the recognition rate was about 96%. Moreover, the literacy of each thing which gave the overcoat was 100%.
- [0051] The honeycomb-like structure with which the catalyst component was supported is conveyed by the catalyst printing process, and is processed under a 400-800-degree C elevated temperature here. In order to be anxious about it becoming impossible for the information written by the honeycomb-like structure to read, and being burned down by support of a catalyst component, or discoloration of the honeycomb-like structure in a printing process, when using the ink jet approach, it is desirable to use heat-resistant ink.
- [0052] Generally, since a catalyst component is not supported by the outside surface of the honeycomb-like structure with masking, the notation of the bar code by which marking was carried out is not buried in it of a catalyst component, but since some discoloration is not avoided, it needs to set up marking conditions, such as a bar code, so that reading may be possible. In the case of laser marking, since decomposition removal of the front face of a member is carried out in the very shallow field, the honeycomb-like structure with which the support process of a catalyst component was passed and the catalyst component was supported is conveyed next to a canning process.
- [0053] At a canning process, the bar code in which the outer-diameter dimension information on the honeycomb-like structure appears is beforehand read with a bar code reader. The read dimension information is transmitted to the production line of a metal vessel in an instant. A metal vessel rounds off a thin metal plate using a press fixture so that it may become a predetermined dimension, it joins a knot by welding, and is formed in a can. The aforementioned information is transmitted to this can manufacturing installation, and the dimension of a can is determined based on that information. Thus, the path clearance between the honeycomb-like structure and a metal vessel (can) is controlled, and optimal combination is realized.
- [0054] Since planar pressure is changed also by the bulk density of the compressive ingredient which intervenes between the honeycomb-like structure and a metal vessel, based on the bar code information on the honeycomb-like structure, a metal vessel and a compressive ingredient can also be selected so that the optimal combination of the honeycomb-like structure, the path clearance between metal vessels, and the bulk density of a compressive ingredient may be acquired. Generally how to make an alphabetic character the means of signal transduction instead of a bar code is also learned.
- [0055] Text is also printable by the ink jet approach or the laser marking approach. In this case, the

printed text is photoed with a CCD camera and recognized by the pattern-matching approach. This approach is the approach of choosing the pattern nearest to the alphabetic character which registers the alphabetic character beforehand and was registered from the shade information on the photoed alphabetic character. this invention persons read with OMRON F350 image-recognition equipment about the figure information on an outer-diameter dimension and mass written by the previous laser marking approach, and checked that signal transduction was rightly possible.

[0056] The reading principle of a bar code reader irradiates laser light on a bar code label, and receives the scattered reflection light by the light sensing portion of a bar code reader. Since strength occurs according to the difference of the reflection factor of a tooth space and a bar, the scattered reflection light is changing this into the digital signal of ON/OFF, and has distinguished and read the tooth space and the bar. Therefore, since reading by the bar code reader becomes difficult when the difference (PCS) of the strength of scattered reflection light becomes small, a bar code also becomes effective [the above-mentioned image recognition art].

[0057] As common Canning's approach, the approach of of the clamshell approach shown in drawing 3 , the approach of pushing in shown in drawing 4 , or the volume fastening approaches which are shown in drawing 5 is used. Moreover, in addition to this, a plastic-working-of-metals technique is applied and the pipe shrinking approach of extracting the outer-diameter dimension of a metal vessel 5 like drawing 6 by applying a compression pressure through a tap (pressurization mold) 11 from the exterior, or extracting the outer-diameter dimension of a metal vessel 5 like drawing 7 by pushing into the fixture 12 which formed the taper in the inner circumference section near [one] the opening edge is also performed.

[0058] Furthermore, rotating a metal vessel 5, as shown in drawing 8 , it is the approach (the so-called roll-forging approach) of narrowing down the peripheral face by plastic working using the processing fixture 13, and it is also possible to extract the outer diameter of a metal vessel 5 and to give planar pressure. If this approach is used, from canning to cone formation will become possible in processing Rhine which was consistent in the combination of narrowing down the both ends of the can performed recently by spinning, and making it a cone configuration.

[0059] Said clamshell approach, the approach of pushing in, and the volume fastening approach wind the compression elastic grasping material (compressive ingredient) 7 around the honeycomb-like structure 1 beforehand, as shown in drawing 3 -5, respectively, the clamshell approach is put, giving a load like drawing 3 by the metal vessels 5a and 5b carried out 2 ****s in it, and it considers as a unification container by welding the part of those mating faces (flange). The pushing approach is really pressed fit in a metal vessel 5 like drawing 4 using a guide 9. The volume fastening approach gives planar pressure by twisting and pulling metal plate 5' used as a metal vessel like drawing 5 , welds the doubling section of metal plate 5', and is fixed.

[0060] According to the clamshell approach, by the approach of gap of a mat (compressive ingredient) taking place and pushing in, in case it holds down by the metal vessel from a vertical side, in case it inserts in a metal vessel, it is an insertion side and gap of a mat takes place. For this reason, if the part which shifted reaches far and wide, also on the whole, planar pressure will become high.

[0061] The approach suitable for giving planar pressure is giving and grasping planar pressure in a metal vessel at the honeycomb-like structure without causing gap of the relative location of a mat and a metal vessel as much as possible. Since the can is in the condition of having surrounded the cellular structure object wrapped in the compressive ingredient, beforehand before giving planar pressure, the volume fastening approach from this viewpoint, the pipe shrinking approach, and the roll-forging approach have small gap of the relative location of a can and a compressive ingredient, and are desirable. [of gap] In addition, the approach of pushing in can also use the pipe shrinking approach or the roll-forging approach for a means to use only as an approach of arranging the honeycomb-like structure in a can, and to give planar pressure.

[0062] Moreover, after grasping the honeycomb-like structure in a metal vessel before support of a catalyst component, the approach of supporting a catalyst component may also be in the honeycomb-like structure in a metal vessel. According to this approach, the honeycomb-like structure can avoid it being

missing or damaging in the support process of a catalyst component.

[0063]

[Effect of the Invention] As explained above, in case the assembly which carried out receipt grasping of the cellular structure object into the metal vessel through the compressive ingredient is assembled according to this invention, even if there is variation in the dimension of members, such as a cellular structure object which constitutes the assembly concerned, etc., the effect is suppressed and the suitable grasping condition that there is no breakage of a cellular structure object etc. is acquired easily.

[Translation done.]

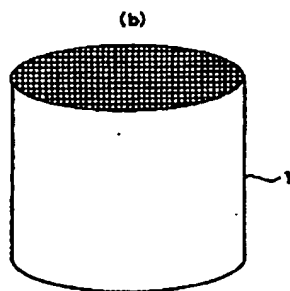
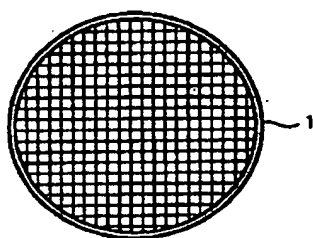
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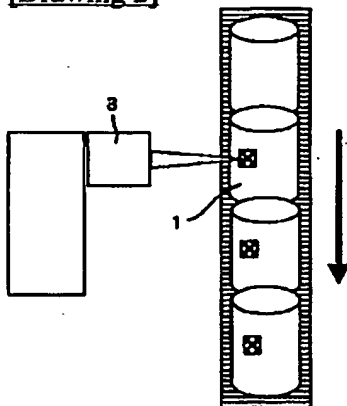
1. This document has been translated by computer. So the translation may not reflect the original precisely.
2. **** shows the word which can not be translated.
3. In the drawings, any words are not translated.

DRAWINGS

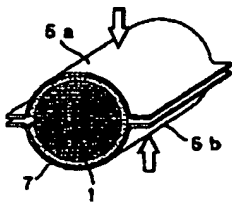
[Drawing 1]



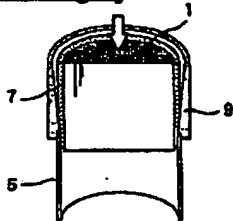
[Drawing 2]



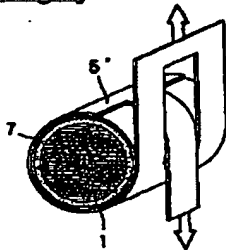
[Drawing 3]



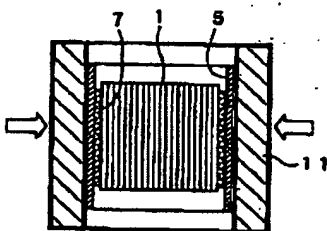
[Drawing 4]



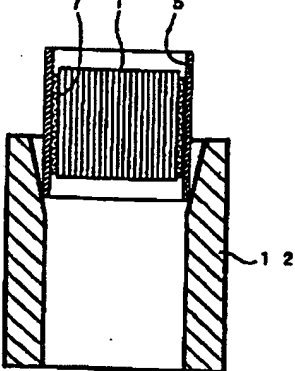
[Drawing 5]



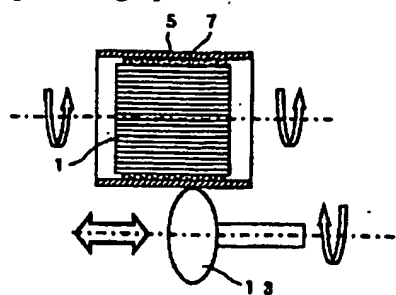
[Drawing 6]



[Drawing 7]



[Drawing 8]



[Translation done.]